process occurs in accordance with the procedures described above and well known in the art and utilizes knowledge of the timing offset t_1. From the found pilot code $\bar{c}_p$ timing, the mobile station knows the pilot code repetition period T_p. Next, in step **44**, M intervals of the received signal $\bar{s}$, corresponding to the possible framing synchronization code locations identified within the synchronization slots s found from the known pilot code repetition period T_p, are then correlated with the authorized framing synchronization code $\bar{c}_s$. This operative step may be mathematically represented by the following:

$$R_i = |<\bar{s}_i, \bar{c}_s>| \qquad (3)$$

wherein:

$0 \leq i \leq M-1$ (i.e., over the M intervals); and

$(\bar{a}, \bar{b})$ denotes the correlation operation.

Next, in step **46**, the frame timing (boundary) is found. In accordance with this operation, if R_i has a maximum when i=n, then it is assumed that the n-th portion of the received signal $\bar{s}$ is positioned at the synchronization slot s in the frame designated for the framing synchronization code (i.e., the first slot s_0 in the illustrated embodiment). Frame timing (boundary) is then found as the relative position to the frame boundary of the designated synchronization slot is known.

A more complete understanding of the process implemented in FIG. **7** may be obtained by reference to a specific example. Accordingly, reference is now again made to FIG. **6**. The operation of step **42** applies a $\bar{c}_p$-matched filter to the received signal. The peaks found from this filtering identify synchronization slot boundaries **30** utilizing the known timing offset t_1. Once these slot boundaries **30** are known, and given knowledge of the type of pilot channel formatting implemented (i.e., timing offset t_2 and framing code position), the included framing synchronization code $\bar{c}_s$ is found using the correlation operation of step **44** and Equation (3) which matches consecutive portions of the received signal $\bar{s}$ at the M candidate locations **32** for framing synchronization codes within the identified slots with the authorized framing synchronization code $\bar{c}_s$. Once the framing synchronization code location **32** is known, and given knowledge of the matched location within the frame (e.g., timing offset t_3 in the first synchronization slot as shown), the frame boundary **34** is identified (step **46**).

Reference is now made to FIG. **8** wherein there is shown a simplified block diagram of a spread spectrum communications system receiver **50**. A receive antenna **52** collects the signal energy of a transmitted modulated spread data sequence and passes that energy to a radio receiver **54**. The receiver **54** amplifies, filters, mixes, and analog-to-digital converts as necessary to convert the received radio signal to a baseband signal. The baseband signal is usually sampled at least once per chip period and may or may not be stored in a buffer memory (not shown).

The baseband signals are passed to a plurality of traffic channel correlators **56** (implementing a RAKE receiver configuration). The operational function of the correlators **56** is sometimes referred to as despreading since the correlation coherently combines the multiple spread data values back into a single informational value when a given despreading sequence is correctly time-aligned with the received sample sequence. The output correlations are provided to one or more detectors **58** which reproduce the original informational data stream. The form of detector used depends on the characteristics of the radio channel and complexity limitations. It may include channel estimation and coherent RAKE combining, or differential detection and combining, as necessary.

In the context of the present invention, the baseband signals are passed to a pilot code searcher **60** specifically designated for pilot channel processing. The pilot code searcher **60** processes the baseband signal to find the pilot code $\bar{c}_p$ timing using the known actions of applying a $\bar{c}_p$-matched filter, identifying peaks and locating a timing reference within respect to base station transmissions and then identifies the location(s) of the included framing synchronization code(s) $\bar{c}_s$ from the pilot code $\bar{c}_p$ location. This information is then passed on to a sync code searcher **62** which implements the specific pilot channel processing of the present invention by determining therefrom the frame timing (i.e., the frame boundary). The operation of the pilot code searcher **60** and sync code searcher **62** are defined by the flow diagrams of FIGS. **4**, **5** and **7**, as well as the Equations (1), (2) and (3). The pilot channel frame and slot timing/synchronization information generated by the pilot code searcher **60** and sync code searcher **62** is then utilized by the traffic channel correlators **56** and detector **58** in reproducing and processing the original informational data stream.

Although embodiments of the method and apparatus of the present invention have been illustrated in the accompanying Drawings and described in the foregoing Detailed Description, it will be understood that the invention is not limited to the embodiments disclosed, but is capable of numerous rearrangements, modifications and substitutions without departing from the spirit of the invention as set forth and defined by the following claims.

What is claimed is:

1. A propagated signal for a code division multiple access pilot channel transmission, comprising:

   a repeating frame comprising a plurality of synchronization slots;

   a pilot code $\bar{c}_p$ repeated in each synchronization slot of the repeating frame; and

   a framing synchronization code $\bar{c}_s$ in at least one of the synchronization slots of the repeating frame.

2. The propagated signal of claim **1** wherein the pilot code $\bar{c}_p$ and framing synchronization code $\bar{c}_s$ are non-overlapping.

3. The propagated signal of claim **1** wherein the framing synchronization code $\bar{c}_s$ if in more than one of the synchronization slots are unique per synchronization slot and are repeated in each frame.

4. The propagated signal of claim **3** wherein the pilot code $\bar{c}_p$ and individual ones of the framing synchronization codes are non-overlapping.

5. The propagated signal of claim **3** wherein the plurality of framing synchronization codes are mutually orthogonal.

6. A method for processing a signal including a pilot channel to obtain timing synchronization information, wherein the signal includes a repeating frame divided into a plurality of synchronization slots, each slot including a pilot code $\bar{c}_p$ and at least one slot including a framing synchronization code $\bar{c}_s$, comprising the steps of:

   correlating a received signal to the pilot code $\bar{c}_p$ in order to find synchronization slot locations; and

   correlating the received signal at a location within the found synchronization slot to a set of framing synchronization code $\bar{c}_s$ in order to find frame synchronization timing information.

7. The method as in claim **6** wherein the second step of correlating comprises the step of matching the framing synchronization code $\bar{c}_s$ to a location within each of the plurality of consecutive found synchronization slot locations in the repeating frame.